EDITORIAL

What Is the Function of Starch?

"Starch should be used for molding purposes rather than for drying out the goods." This is a conclusion which may be drawn from the series of articles from the Bureau of Chemistry, which is concluded in this issue, page 22, on Improved Methods for the Manufacture of Fondant Goods.

By the use of the new methods, which have been worked out and proven in a practical way, fondant goods may be taken out of starch in about an hour's time. These articles deserve a very careful reading and re-reading. A public patent has been granted to Dr. Paine and J. Hamilton on this important research work, which has been accomplished in the government laboratories. It is, therefore, public property and may be used without payment of royalty.

These new methods for manufacturing fondant goods involve the use of invertase. It is rather unfortunate no manufacturer of invertase is advertising his product so that our readers may be directed to the source of supply, however, you will find three reliable manufacturers of invertase listed in the Manufacturing Confectioners Blue Book (page 164), which is ready for distribution. We will be glad to receive any specific questions or inquiries regard ing the discussion of thiss ubject which has appeared in THE MANUFACTURING CONFECTIONER.

Good Packing Pays

The campaign for better packing, which is being waged at this time in nearly all industries using shipping containers, has some very definite economic objectives. For instance, consider these figures representing an expense which places a burden on business, not only because of the money involved, but the more far reaching effects in form of losses in time, good will, etc., occasioned by failures in the delivery of shipments and damage to merchandise:

1. **Freight claims, which are occasioned by inefficient shipping containers approximate an expense of $25,000,000.**
2. **Estimated cost to shippers and carriers in handling claims due to inefficient containers—$6,000,000.**
3. **Estimated recooperage expense—$4,000,000.**

Inasmuch as containers reinforcement has proven to be the biggest factor in successfully reducing these losses, the object of the campaign is to increase the use of box strapping. Shippers should take the initiative to reinforce their containers, however, consignees who suffer more or less annoyance from loss and damage should be willing to co-operate in this movement by requesting their shippers to use strapping where the need for it is indicated.

A Short Editorial

Now that the Excise Tax is removed and $11,000,000 is saved to our industry, how many candy manufacturers are willing to contribute one-tenth of what they have previously paid to the government toward a fund for a national candy selling campaign, which would logically increase each individual manufacturer's business from 20 to 50%?

Getting Rid of the Seasons

OF ALL the so-called "unsolvable" problems of business, perhaps the most expensive and the least necessary is the problem of seasonal production.

Few concerns make any effort to solve the problem. They accept it as unalterable, probably in the belief that the seasons are an act of God. If they are rich they pile up inventories for a short selling season by keeping the plant going the year round. If they can't finance that, they shut their plants down.

Yet every year a few more concerns succeed in doing away with seasons. A branch of the garment industry reduced costs and prices enough by year round production to greatly lengthen the selling period. Another business reduces prices in the off-season as an incentive to its retailers to buy then.

A soap manufacturer found that it was the jobber who had the seasonal hallucination. When he went direct to the retailer he found that people wash with soap the year round. He now guarantees year round employment to his workers.

Even the building industry which comes in closest contact with cold and snow has found that in most climates construction can go on in the winter as well as any time. The American Construction Council has shown that the building season can be lengthened and hopes ultimately to do away with the peaks and valleys in its industry entirely.

When more concerns cease hibernating during off seasons, their profits will be bigger and labor troubles fewer. A little study will show any industry that it need not have such violent seasonal fluctuations.—*By William R. Basset, President of Miller, Franklin, Basset & Company, Inc.*

The Blue Book Is Out!

Care of Raw Materials in and Out of Storage

by Albert Adams Lund

DO YOU KNOW—

1—**When low temperatures are unnecessary** and, in fact, actually harmful?
2—**What is the best temperature** for storing nutmeats and dried fruits for short periods?—for periods of over a month?
3—**How to prevent** sweating and avoid the probability of mold on withdrawing goods from cold storage into warm summer air?
4—**What precautions are necessary** in spreading nutmeats and under what conditions it is advisable?
5—**In case of congestion** in your storeroom, do you know which materials may be stored in the factory proper with least or no loss?

The answers to the above will suggest ways to minimize the deterioration of your raw materials in storage.

Causes of Deterioration

FOR all practical purposes, the deterioration of a raw material in storage is either due to the fact that the goods were of inferior quality when they were purchased, and hence not suitable for long keeping; to conditions of storage which were not suited to the character of the material; or to overstaying the normal life with which that class of material is endowed. In any case some measure of responsibility for the resulting loss is certain to be traced to the buyer, for unless he had faith in the keeping quality of the material and in the adequacy of the storage facilities, what right did he have to buy ahead of his current requirements? It is the old and logical indictment. No saving through quantity purchase justifies an inventory of depreciating or worthless material. On the other hand, if we understand the factors which influence this deterioration and know to what extent they may be controlled under suitable storage conditions, we may feel reasonably qualified to take advantage of market conditions by covering ahead for definite periods of known consumption.

Material Suitable for Storage

Only sound material of the best quality should be stored. Defective, unrefined or below-grade materials deteriorate much more rapidly than perfect materials of the better grades and consequently should be stored with discretion, if at all. The importers save their best lots to put into cold storage on May 1st while trade manufacturers who carry year-round stocks not only set aside their best runs, but often make up special batches qualified to withstand the severe stress of storage conditions. Allowing for a certain amount of unavoidable deterioration, these lots will still come out of storage in a sound merchantable condition where a stored lot of inferior quality may be so far gone as to be unfit for human consumption.

Under favorable conditions the normal life-span of the different materials varies greatly. Some of them are too highly perishable to keep under any conditions while others will remain sound in ordinary storage for an indefinite period. Where deterioration occurs it is usually proportionate to the length of time the material has been subjected to the conditions which caused it. Therefore, time is a critical factor. The sun may beat down and the humidity roll up on a highly perishable material, but if it is used up immediately no harm may come of it, while a much less unfavorable condition of longer duration may ruin it completely. In most states there are laws which prescribe the maximum length of time during which food materials may be held in storage.

In a few notable exceptions, the process of ageing is actually beneficial, the elements at

work tending to take the edge off certain harshnesses of flavor, etc., and make them, commercially, more desirable. The aroma of refined peppermint oil has been said to become more delicate even after ten or twelve years, although for our purpose it may be considered to have reached its maximum smoothness by the end of six months. Ageing slowly whitens flour and improves its baking properties. Likewise the mellowness of six- to twelve-months' old vanilla extract, the strong rummy character of old crop molasses and the improvement in flavor of aged chocolate coatings and liquors are too well recognized to require extended comment.

Apart from the controlling element of time, the chief factors which influence the deterioration of raw materials in storage are as follows:

Temperature.

Humidity.

Ventilation (the exposure to or the lack of air).

Light.

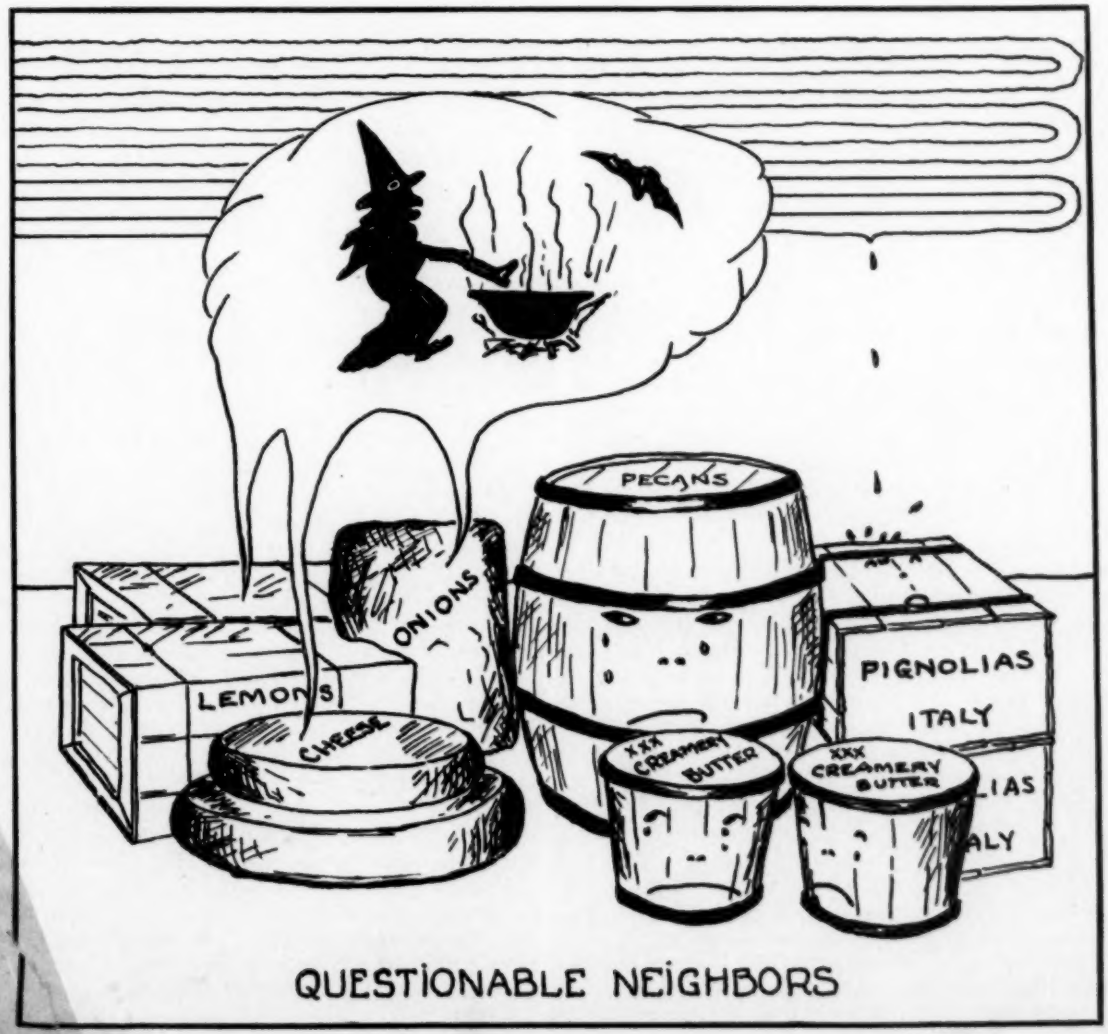
Proximity to odor-emitting substances.

Infection and contamination.

Temperature

The recent and constantly-increasing application of cold storage to the preservation of food materials has apparently led to the illusion that cold storage preserves things indefinitely. Without detracting a particle from the immense value of cold storage, there are certain facts which we would do well to remember in connection with its use.

Cold is simply the absence of heat, and since heat is a natural catalyst which favors and accelerates organic and bacterial action and the development of insect life, cold is said to retard these factors and prevent a part if not all of the deterioration which would take place at ordinary atmospheric temperatures. On the other hand, there are many materials for which cold storage temperatures are neither essential nor desirable. For some, they may be positively harmful. Honey, for instance, stores best at temperatures around 100° F., and market milk, which requires a 30°-40° temperature for the short carry, may become unfit for human consumption if it is kept sweet by this agency for



QUESTIONABLE NEIGHBORS

long periods at a time. Consequently, while recognizing the enormous economic value of cold storage for the protection of food materials, we must also realize that it is a measure to be employed with discretion.

Where there is considerable difference in temperature in the parts of a plant allotted to storage (this difference often amounting to 10° to 25°), the location of materials in ordinary storage must be governed by their particular storage needs and preference in the cooler portions given to those materials which actually require low temperatures in order to keep. Instead, one often finds perishable items like nuts or condensed milk crowded out of the factory storeroom for no other reason than that it is already full to the doors with such wholly unappreciative items as salt and maple sugar.

Humidity

The temperature to which the goods may be subjected with safety often depends upon the dryness of the material and the humidity of the atmosphere which surrounds it. If the air is dry, the material may withstand a higher temperature than if it is damp. The presence of moisture in the material or its subsequent absorption from the atmosphere encourages the growth of moulds and other organisms which eventually result in the spoilage of the material.

Fluctuations in temperature under relatively high humidity conditions increase the danger of deterioration from this source, by alternately causing the evaporation and condensation of moisture on the surface of the material. Goods withdrawn from cold storage into warmer atmospheres are particularly susceptible to moulding and kindred ills, and the origin of the loss is very often traced to some innocent factor.

One plant had a great deal of trouble with sugar-coated Jordan almonds and cordialled sugar drops. Both were subject to continual spotting and the human thing to do was to blame the colors. So for three or four months they experimented with vegetable and aniline colors. At last it was realized that the trouble was due to the lack of suitable temperature control when the goods were taken out of the cold room. The almonds sweated and the sugar shells of the cordials cracked and leaked. When the moisture dried it left a lot of colorless rings on the surfaces of the candies. The same phenomenon induces the losses in raw materials, already described.

The loss of small amounts of moisture through evaporation is not usually sufficient to destroy the appearance or saleability of a raw material, but it will seriously affect the supplier's profit, where the goods are sold by weight. For this reason, cold storage is often employed to prevent shrinkage where it might not be at all necessary as far as the manufacturer or consumer were concerned.

The reproduction of animal life is favored by conditions of heat and high humidity; if the storage conditions are dry, a higher temperature is required for the process to take place. 80° F. is given as the temperature most suited to development. Below 60° F. and above 105° F. the infection is retarded if not entirely prevented, and since the higher temperature is not generally practical from a storage standpoint, materials which are susceptible to infestation should be stored below 60° F.

The invention of the recording thermometer and the recording psychrometer and their widespread adoption wherever food materials are held or employed, have brought in a new era in the application of scientific storage principles to our every day methods of caring for factory materials. Equipped with these means of interpreting temperature and humidity conditions, the judicious placement of the materials to be stored and the proper employment of air conditioning, artificial refrigeration and ice cold storage give us a wide range of selection in the means by which our raw materials may be protected from deterioration while on our hands. The control of ventilation and use of absorbents to regulate humidity conditions will be discussed in the concluding chapter of this article.

Suppose we consider the concrete application of these principles to the different groups of raw materials commonly handled in our plants. The first of these groups is dried fruits.

Dried Fruits

Dried fruit, which is to be stored, must be properly and uniformly dry. This much is essential. It is considered properly dry when the flesh shows no moisture when it is torn across and squeezed vigorously between the fingers.

It is customary for the trade to place dried fruits, such as apples, raisins, apricots and prunes, in cold storage about the first of May, but low temperature is not vital, for the fruit keeps perfectly well in a warm room provided certain simple precautions are taken. The chief purpose of temperatures between 30° and 40° F. is to prevent loss in weight through evaporation. That they are also effective in preventing mould, fermentation and the development of insect life goes without saying. While raisins are often included in the class of fruit requiring low temperature storage, it is conceded in most quarters that like figs and dates, they store better around 50-55° F., with less danger of crystallization. In any event it is desirable that the temperature selected be uniform and that any transition from cold storage to warm summer air be made as gradual as possible in order to avoid sweating and consequent spoilage by mould.

Properly dried fruits have nothing to fear from a warm, dry room with free access to air. The small amounts of moisture which they take up in damp weather are quickly lost on the return of dry weather. To keep them near heating pipes is simply to continue the drying process, which is the means of their preservation. The two chief sources of possible injury are

strong light, which causes light colored fruit to darken, and insects. The packages should be capable of excluding both, without being absolutely air tight. (If the containers are completely sealed the alternate evaporation and condensation of moisture on the surface of the fruit during changes in temperature may result in mould.)

Should the fruit become subjected to a prolonged spell of excessively high humidity, causing it to absorb a great deal of moisture, it should be put in the hot room and given a sufficient heating to restore its original dryness.

Shelled Nuts

Best results with nutmeats have generally been obtained from temperatures around 32 F. with a rather dry storage. With the exception of peanuts, the trade stores practically all shelled nuts for the summer between 30 and 40 F., although for periods of less than a month a temperature of 50-60 F. is undoubtedly preferable, since it is sufficiently low to retard deterioration while eliminating the danger of the nuts sweating and moulding on being taken out into ordinary summer temperatures. Nuts withdrawn from cold storage should be "acclimated" by placing them in an intermediate storage temperature of, say 60, for a short period thereafter. Quite unlike dried fruits, low temperatures are essential for prolonged storage.

The nuts should be thoroughly cured to withstand the storage season successfully. The sheller who put stickers on his brazil and pecan barrels exhorting his customers to spread the goods on arrival at their factories in order to prevent moulding may have referred to the possible results of sweating, but he lays himself open to the charge of putting out under-cured goods. As a matter of fact, spreading should never be resorted to unless you are absolutely sure that there are no moths or other insect life present to infect them. Careful drying in a hot room will accomplish the same purpose without the after effects.

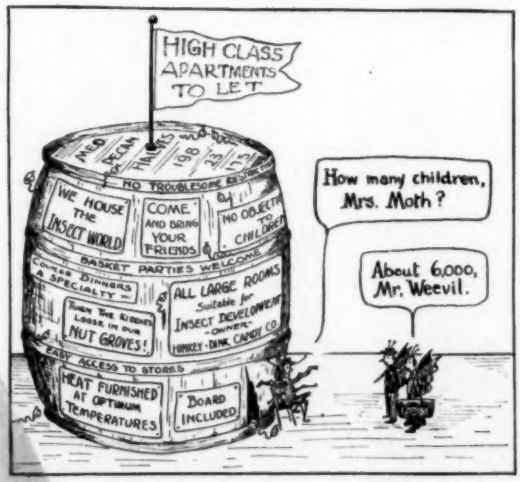
Certain nuts, like almonds and pistachios, which are not particularly susceptible to mould, do not require the same careful attention in regard to humidity conditions as do pecans, walnuts, under-cured brazils, etc. Because of the "breathing" action referred to in the previous articles, filberts should be kept in a place of uniform temperature. This breathing increases the likelihood of moulding. Cashews are extremely susceptible to animal matter, and consequently must be kept in a cold place at all times. Peanuts require a cool, dry place with adequate ventilation; cold storage is unnecessary.

Packages should not be left open in storage after sampling and boxes and barrels, which are in use in the factory, should be provided with covers to keep out insects.

(To Be Concluded.)

We Hear from the Moth

With Apologies to Don Marquis



A series of three articles on "Desk Tests for Shelled Nuts" was concluded in July issue of "The Manufacturing Confectioner."

well, boss, i managed to get the family over in a case of fresh-cracked walnuts. caught a slight cold in one of these public detention warehouses but nothing serious. it was nice and warm coming across and we all had plenty to eat, but the captain's cat kept prowling around the hold all night which made me nervous and confined us rather closely to our quarters. These cat persons are a blamed nuisance. my cousin annie wirelessed that she was coming to america in a bag of cocoa beans but she has been held up temporarily by the government's new fifteen per cent quota. these immigration laws sure get her angorra. she say never mind if she cant come to america she'll get to germany and holland in some four and a half cent cocoa where they send the cocoa butter all over to america so anyway. i heard you say boss as how pecans were going to be scarce again this year. i do hope your fears are unfounded as they are my favorite fruit. we were all greatly shocked to hear the twist this problem of birth control has taken. there ought to be a law against it. these therapeutic and taxic gas treatments some of the candy people are fooling around with are tough on the young worms. they tell me i am getting old. as long as there are eggs in my basket and a handsome young man-moth in the offing i'll never feel old. henry ford lived to see his ten millionth lizzie. i do hope old age spares me to see my millionth granddaughter. a french medium told my mother that i was the re-incarnation of pandora who opened the box of trouble upon the world. she said that i must live up to the reputation of my illustrious ancestor. so here goes, what the hell.

CHEMISTRY and
CONFECTIONERY MANUFACTURE

Preventing Drying and Controlling Consistency of Fondant Centers

This is the third and last installment of the complete article on "Improved Methods in the Manufacture of Fondant Goods."

by H. S. Paine and J. Hamilton

Bureau of Chemistry, U. S. Department of Agriculture

A View of One Section of the Carbohydrates Laboratory, Bureau of Chemistry, Showing Mr. Hamilton and His Assistant.

IN THE two previous installments of this article the composition and structure of fondant have been explained and discussed and the way has been prepared for a thorough understanding of the principles involved in the new processes discussed in the present installment. It may be regarded as axiomatic that the manufacturer of any article needs to know as intimately and comprehensively as possible the relations between cause and effect which determine the character and quality of his product. The more fully these factors are known and understood the greater is the possibility of applying this knowledge constructively in a practical way.

The "Doctor" or Inverting Agent

Since, as has been explained, the consistency of a fondant depends to a great extent upon the total amount of sirup films present in relation to total amount of microscopic sugar crystals, some means of increasing the former at the expense of the latter would obviously be of great practical value for purpose of producing and maintaining any desired degree of consistency —particularly if this could be accomplished after the goods are finished and encased in chocolate or other coating, thereby permitting the goods to be of firm consistency during the early stages of manufacture. The most evident means of accomplishing this object is by "inversion," i. e., by transforming cane sugar (or beet sugar) into invert sugar. The latter is in reality not a single sugar, but consists of a mixture of the two sugars dextrose and fructose in equal proportion. Dextrose is the principal sugar contained in commercial glucose or corn sirup, and fructose, which is sometimes termed "fruit sugar," is one of the typical sugars of fruits. Inversion of ordinary sugar is usually accomplished by means of an acid or an acid salt. Among the acid substances which are used in confectionery manufacture may be mentioned cream of tartar and citric, acetic and tartaric acids. The term "doctor," frequently used in the confectionery industry, means practically the same thing as the chemical term "inverting agent," i. e., a substance which inverts ordinary sugar. Water, itself, being usually slightly acid, causes some inversion of ordinary sugar when the latter is dissolved therein and the resulting sirup is heated for a period. A sirup partially inverted in this manner is frequently referred to as being "water killed."

Now, the solubility of the total sugars present is increased as a result of inversion, or, in other words, a given amount of water will permanently hold in solution a greater total amount of a mixture of ordinary sugar and invert sugar than it will of ordinary sugar alone. Whereas the amount of cane sugar present in a pure saturated solution at ordinary temperature is approximately 67 per cent of the weight of the solution, the solubility of the total sugars present may be increased to approximately 81 per cent by transforming a suitable proportion of the cane sugar into invert sugar. Owing to this increase in solubility and the resulting increase in amount of sirup films in relation to sugar

crystals, a fondant which is partially inverted becomes of softer consistency. Corn sirup also influences the solubility. It may be remarked incidentally that, aside from a certain softening effect due to ripening, inversion is the only factor in plain cream centers which tends to cause them to become softer with time, all other factors, such as evaporation, etc., exerting their influence in the opposite direction.

Unfortunately, the softening of fondant through inversion by acids or acid substances is generally not feasible in practice where it is desired to cause inversion to occur at ordinary temperature, i. e., after the fondant center has been coated. This difficulty is due to the fact that the amount of such acid substances which can be added is limited because of their influence on flavor and the inverting action of the small proportions which are permissible from this standpoint is so slow at ordinary temperature as to produce very little beneficial results. On the other hand, a very considerable degree of inversion may be accomplished by acid substances, such as cream of tartar in cases where the batch is subjected to higher temperature as in making hard candy. The degree of inversion accomplished at ordinary temperature by the amount of acid substances which is permissible in fondant from the standpoint of flavor is considerably less than is frequently assumed. A substance which is inert so far as influence on flavor of the goods is concerned and which in permissible amounts is capable of causing a sufficient degree of inversion at ordinary temperature is, therefore, the ideal inverting agent for fondant confections.

Invertase Is Nature's "Doctor"

The foregoing situation has, therefore, suggested to the writers the use of the enzyme invertase as an ideal inverting agent for fondant. Its inverting efficiency is relatively greater at ordinary temperature than that of acids when each is added to fondant in permissible amounts. The word "enzyme" is a chemical term used to designate an organic substance which in extremely small proportions is capable of causing a chemical change without itself undergoing any change. Among other enzymes which are in more or less general use may be mentioned pepsin and diastase. The former is capable of digesting meat, egg albumin, etc., i. e., in chemical terms it causes a transformation or breaking down of protein. Diatase is present in barley malt, and its specific function is to transform starch into the sugar maltose. The enzyme invertase is widely distributed in nature. It is, for instance, secreted by honey bees, thereby enabling the bees to transform the ordinary sugar in floral nectar into invert sugar, which is the characteristic sugar of honey. In nature inversion of cane sugar is accomplished by means of invertase rather than by acids.

The Action of Invertase in Fondant

Keeping in mind that fondant consists of minute sugar crystals enveloped by films of sirup, it should be remembered that invertase when added to fondant is present in solution in the sirup films. The mechanism of the action of invertase is as follows. A portion of the cane sugar dissolved in the sirup films is gradually transformed into invert sugar, and as a result of increased solubility due to both cane sugar and invert sugar being now present in mixture, the sirup films become capable of dissolving an additional amount of cane sugar. The sirup films being in direct contact with the microscopic sugar crystals now dissolve some of these crystals completely and by partial solution reduce the size of other crystals. This increases the proportion of sirup films at the expense of the sugar crystals, and the fondant, therefore, becomes of softer consistency. Furthermore, as a result of this action, coarse or granular fondant tends to become smoother owing to partial solution and reduction in size of excessively large sugar crystals or aggregates of crystals. The use of invertase in fondant is covered by U. S. Patent 1,437,816 granted to the writers. This patent is dedicated to public use without payment of royalty. (*See description of patent on page* 27.)

For All Types of Fondant Goods

Invertase may be used to advantage in varying proportions for all fondant type confections. Such confections of this type as are coated with chocolate may for convenience be divided into three groups. Group 1 comprises the cheaper bulk or pail goods prepared with a maximum proportion of corn sirup. Such goods usually have a rather thin coating of chocolate, and a sufficiently firm consistency must be maintained in order to prevent crushing. The minimum proportion of invertase is to be used in this group, the purpose being merely to cause inversion of cane sugar to occur very slowly at such a rate as to compensate as nearly as possible for the effect of the gradual evaporation of moisture on the consistency of the fondant. The retention of moisture is thereby increased by several per cent, and the shelf life is considerably prolonged. This increased retention of moisture is due primarily to the hygroscopic or moisture-retaining character of fructose, one of the constituents of invert sugar.

Experiments in which identical batches of rather thinly coated chocolate creams were prepared with and without addition of invertase showed an initial moisture content in the fondant of approximately 11 per cent. After a period of standing at room temperature in rather warm weather for four months the moisture content of the pieces prepared without invertase was about 3 per cent and that of the pieces prepared with invertase was as high as 6.8 per cent. The centers of the former were chalky white in appearance and quite hard, whereas the centers of the latter were still moist and retained their plastic character. In the absence of inversion a difference of only 1 per cent in water content may have a great influence upon the consistency of fondant. It is impor-

tant to note in this connection, however, that the total water content may even decrease to a considerable extent, and yet if sufficient inversion has occurred the plasticity and apparent moistness of the fondant center may be practically as great as when the confection was originally prepared. In other words, as far as effect on consistency is concerned, the solution of a certain proportion of microscopic sugar crystals in the sirup films as a result of inversion and the consequent increase in amount of sirup films at the expense of sugar crystals has been sufficient to counterbalance the effect of actual loss of water resulting from gradual evaporation after the goods are finished; or, to state the matter in still another way, the capacity of a definite amount of water to maintain a given degree of soft consistency has been increased as a result of increased solubility due to inversion.

In Group 2, which includes higher class goods with an increased proportion of cane sugar, invertase may be used for the same purpose as in Group 1 or it may be employed in increased proportions for the purpose of obtaining any desired degree of soft consistency up to and including flowing centers of such consistency as to flow by gravity when the confection is broken. In this case it is necessary to invert a greater proportion of the cane sugar present in the sirup films than is the case in Group 1—that is, the proportion of sirup films in relation to amount of sugar crystals must be greater in Group 2 than in Group 1.

Group 3 includes types of confections in which it is desired to produce complete liquefaction of the fondant—i. e., to cause such a high degree of inversion as will result in the solution of all the minute sugar crystals in the sirup films. One of the constituents of fondant, the sugar crystals, thus completely disappears, and the second constituent, the sirup film, alone remains—or, in other words, the fondant is completely transformed into sirup. This group includes confections with cordialized fruit centers; for instance, those in which cherries, strawberries, raisins and pieces of pineapple, peach, fig, etc., are coataed with fondant, and the latter in turn coated with chocolate. The action of invertase on the fondant causes complete liquefaction, the final result being fruit and sirup, the whole being encased in chocolate.

The total water available for completely dissolving the minute sugar crystals of the fondant in such products evidently consists of that present in the form of sirup in the fondant plus that present in the form of juice or sirup in the fruit, the proportion of water in the latter being dependent upon the manner in which the fruit has been processed. Without inversion the total amount of water which it is practicable to have present in this manner is not ordinarily sufficient for dissolving all the minute sugar crystals. In the case of pineapple, which is a very juicy fruit, and, therefore, of high water content, it is possible by processing the fruit in a low density sirup, or by omitting processing altogether, and also by taking care not to coat the fruit with an excessive proportion of fondant, eventually to secure complete liquefaction without any considerable degree of inversion. However, in the case of most other fruits, and particularly when processed in higher density sirups, it is ordinarily necessary to secure a considerable degree of inversion in order that the total amount of water present may be able to dissolve all the sugar crystals of the fondant. It is obvious also that the rate of liquefaction is in addition influenced by the rate of diffusion of the moisture from the fruit into the fondant, i. e., the rate at which the juice or sirup of the fruit diffuses into the fondant and mixes with the sirup films of the latter. By using invertase it is always possible to secure the necessary degree of inversion to permit the total amount of water present to produce its maximum effect in dissolving the sugar crystals of the fondant.

It must be kept in mind that invertase itself is not a direct solvent of sugar. Water is the dissolving agent and invertase accomplishes its beneficial results by indirectly increasing the amount of sugar crystals which a given amount of water is capable of dissolving. Hence, with fruit which has been processed or handled in such manner as to be quite dry and low in moisture content, the total amount of water present in both fruit and fondant may not be sufficient, even with the assistance of invertase, to completely dissolve the sugar crystals of the fondant. However, we have found that with properly processed fruit there is no difficulty in obtaining 100 per cent liquefaction in cordialized centers when invertase is used.

It is pertinent in this connection to call attention to the danger of remelting fondant at too high temperature in the case of fruit centers which are formed by casting in starch. The water present in the sirup films of the fondant constitutes a portion of the total water available for completely dissolving the sugar crystals of the fondant and an excessive remelt temperature causes needless evaporation and loss of some of this water. An additional advantage of the invertase procedure lies in the fact that it makes possible the handling of the fruit in drier condition prior to and during dipping in fondant than is possible without use of invertase, thereby increasing factory capacity at this stage. The advantage resulting from use of invertase may be turned to account either by using the customary amount of fondant with a somewhat drier fruit than ordinary or by increasing the amount of fondant with fruit of usual water content. The manufacturer may make such adjustments as suit his particular requirements.

Invertase may be used in bonbon centers in the same manner as in chocolate coated cream centers, the degree of consistency obtained being determined by the proportion of invertase added. Invertase may also be advantageously used in other types of candies, such as fudge,

which are intermediate in character between a straight fondant type and other types of candy but which have a consistency determined to a certain extent by the presence of cane sugar. In such types of candy invertase is employed primarily for the purpose of producing slow inversion and thereby retarding evaporation of water and ageing.

Inversion Prevents "Bursting Centers"

Another important result of increased solubility and density of the sirup films caused by inversion is the tendency, as a consequence of increased osmotic pressure, to retard and even prevent the growth of microörganisms, such as certain bacteria and yeasts of the Torula type, which are capable of growing in sirups of rather high density. Such microörganisms have caused considerable financial loss to candy manufacturers owing to gas-producing fermentations which proceed so far as to burst and shatter the candy. Such so-called "explosive" fermentations have been most prevalent in "hand rolled" creams—i. e., fondant containing a very high proportion of cane sugar. In such cases the solid content of the sirup films in the fondant would approach the minimum of approximately 67 per cent. The increase in total solid content from a minimum of 67 per cent to a possible maximum of 81 per cent represents a margin which may be of vital importance in determining whether such growth of microörganisms may or may not occur. This maximum of 81 per cent may be further increased by the solubility influence of other ingredients and by supersaturation.

Speeding Up the Manufacturing of Fondant

The use of invertase has also made possible a rapid and continuous process for manufacture of fondant type confections which is more in keeping with modern manufacturing methods than the intermittent procedure hitherto prevaling. In this process the temperature to which the initial sirups (including "bob") are boiled is increased, thereby decreasing the original water content of the fondant and rendering the molded fondant pieces more firm. This procedure eliminates the scrap which results from the mechanical handling of fondant pieces when the attempt is made to produce a soft fondant by boiling the initial sirups to low temperature and high moisture content. As soon as the fondant is creamed it is at once remelted and cast in starch molds without waiting for it to ripen. The boiling temperature for the "bob," or the sirup from which the fondant is produced, or for both, may be considerably higher than customary, the exact temperature being dependent upon the proportion of fondant and "bob" and the type of goods being manufactured. As soon as creaming is concluded, and without waiting for the fondant to ripen, the fondant is remelted with addition of "bob." The melted batch is then immediately transferred to a depositor or other suitable mechanical device and cast in starch. The individual fondant pieces are only allowed to remain in the starch molds during the time required for cooling instead of 12 to 24 hours as heretofore. In other words, instead of relying upon the starch to reduce the moisture content of the fondant and thereby render it sufficiently firm for mechanical handling, a sufficient amount of moisture has been removed at the beginning of the process by boiling the initial sirups to higher temperatures.

The net result is to yield molded fondant pieces that can withstand all types of mechanical handling and conveying without producing scrap. The action of invertase after the mechanical operation is completed produces the necessary increase in amount of sirup films at the expense of sugar crystals and thus provides the requisite margin of safety against treatment which might otherwise ruin the consistency of the fondant by producing too great an amount of sugar crystals and insufficient sirup film. This process results in an increase in factory capacity at this stage, inasmuch as the fondant pieces remain in starch for a shorter period, and fewer starch molding boards are required for handling a given amount of material. Also, since the proportion of moisture removed by the starch is diminished, the reheating of starch in the drying rooms need be done less frequently. This process is advantageously used in modern factories operating by the gravity system of handling and conveying materials during course of manufacture, and tends to permit the process part of the factory operation to keep pace with the many ingenious types of machinery that have been introduced in recent years for the purpose of supplanting hand labor and increasing factory capacity. Applications for public patents to cover the foregoing rapid and continuous process have been made by the writers.

In using invertase in fondant goods invertase is added either at the time the initial sirup is creamed or when the batch is remelted for casting in starch. In the case of hand rolled creams the invertase may be worked in the batch at the time flavor is added. Since the volume of invertase solution employed is quite small and thorough incorporation in the batch is essential, there is some advantage in adding the invertase while creaming—i. e., during a period of thorough agitation. At high remelting temperatures, which are unusual in practice, a certain proportion of invertase is destroyed, but unless time and temperature of remelting are excessive this may be readily compensated by somewhat increasing the proportion of invertase. No difficulty is encountered at ordinary remelt temperatures, but it is recommended that stirring be sufficiently efficient to incorporate the invertase in the batch without local overheating. The use of a thermometer is good insurance against overheating.

The activity of a given amount of invertase varies to a certain extent with slight changes in the degree of acidity of the batch. In this connection, it should be kept in mind that a fondant prepared from ordinary sugar and glucose

is usually very slightly acid, due to the inherent nature of the ingredients. In order to develop the maximum activity of invertase, it has been found advisable to add two-tenths of an ounce of either citric or tartaric acid crystals per 100 pounds of fondant. This acid may best be added in the form of a saturated water solution. This proportion of citric or tartaric acid is hardly perceptible to the taste and has practically no inverting action in itself, as may be readily demonstrated by comparing batches made with and without addition of this amount of acid. Practically the sole effect of citric or tartaric acid in this small amount is to develop the maximum invertase activity, thereby making it possible to better standardize the use of invertase.

As fondant becomes of softer consistency, it tends, other conditions being equal, to become somewhat less white. This tendency is the result of inherent physical properties and is a consequence of the increase in amount of sirup films and decrease in sugar crystals. It is independent of the nature of the inverting agent. As explained in the second installment of these articles, the white color of fondant is due, to a considerable extent, to the minute air bubbles contained therein, and the smaller the air bubbles the more pronounced the effect. The tendency of the minute air bubbles to aggregate and become larger, thereby diminishing the degree of whiteness, becomes greater as the proportion of liquid, i. e., sirup films, in the fondant increases. This tendency may be counteracted by adding a small proportion of an egg albumin preparation at the time the fondant is remelted. The effect of the colloidal albumin is not only to introduce a certain proportion of minute air bubbles, but also to prevent or retard the aggregation of the small air bubbles already in the fondant. Furthermore, the egg albumin, by producing a certain colloidal "structure" in the fondant, tends to prevent an excessively fluid consistency which might result from too great inversion and, therefore, acts as a safeguard against the latter. The proportion of albumin should not be so great as to produce a spongy consistency (marshmallow type).

Determining How Much Invertase to Use

In employing invertase in the way above indicated, it is obvious that precautions must be taken to prevent greater degree of inversion than is desired. This phase of the matter has been very carefully studied and has been satisfactorily solved through the use of a carefully standardized invertase preparation of constant strength and activity and by determining the most suitable proportions of invertase for each type of confection, the proportion being varied according to whether it is desired, for instance, to produce a flowing center within ten days subsequent to manufacture or after a period of five to six weeks. The approximate time elapsing between manufacture and consumption is also taken into account, and there has been found in actual practice a sufficient margin of safety to permit standardization of the process on this basis for each particular type of confection. It is, of course, also possible for each manufacturer to incorporate his own ideas regarding consistency, and after a few preliminary trials on a small scale to secure the particular type of consistency which he desires. In fact, it is recommended that in all cases a few preliminary trials on a small scale with varying proportions of invertase be made in order that the method may best be standardized by each manufacturer for his particular products.

Invertase has until comparatively recently only been available in very small quantities through chemical supply houses, and has been used primarily by chemists in special investigations. However, as a result of the discoveries outlined in this article invertase has recently been placed on the market in commercial quantity. In the small proportion in which it is used, it is inert so far as imparting any odor, flavor or color to candy is concerned. The cost of invertase per pound of candy is ordinarily only a fraction of a cent.

Invertase has been in commercial use now for several months with very satisfactory results and upon a constantly increasing scale. This article has been written for the purpose of placing before candy manufacturers a rather thorough explanation of the principles involved in the use of invertase, and incidentally to explain the structure, composition and behavior of fondant from a chemical and physical standpoint. It is hoped that this more intimate insight into the nature and behavior of fondant will serve to stimulate interest in this aspect of the subject and to bring forth additional improvements.

The writers will be glad, so far as they are able, to answer inquiries regarding the matters discussed.

WHAT'S NEW?

New Patents

1,502,207. Process for Preparing Confections Coated with Fondant. Howard S. Paine, Chevy Chase, Md., and John Hamilton, Washington, D. C., dedicated, by mesne assignments, to the Citizens of the United States of America. Filed Mar. 4, 1924. Serial No. 696,886. 8 Claims. (Cl. 99—16.) (Filed under the act of Mar. 3, 1883, 22 Stat. L., 625.)

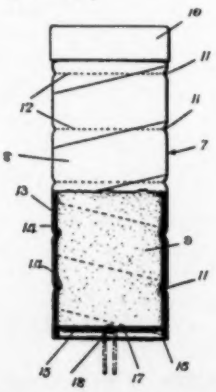
4. A procedure for preparing a fondant-coated confection, wherein invertase is added to the fondant coating and the confection is warmed to a temperature of 80° to 120° F., with addition of water vapor to increase the humidity of the atmosphere during heating.

5. A confection with a center and fondant coating, both of which contain invertase.

65,340. Confectionery Box. Alvin P. Johnson, Swampscott, Mass. Filed May 21, 1924. Serial No. 9,676. Term of patent 14 years.

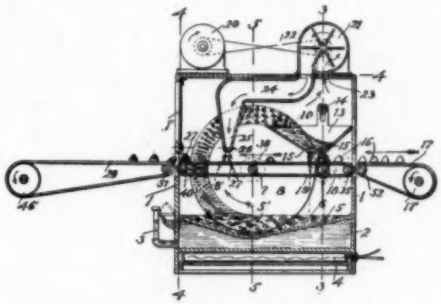
The ornamental design for a confectionery box as shown and described.

1,502,864. Confection. Joseph F. Milligan, Swissvale, Pa. Filed May 20, 1922. Serial No. 562,378. 4 Claims. (Cl. 206—56.)



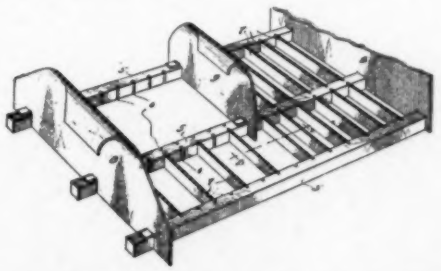
1. A shell for holding an edible filling having a closure at one end, and means carried by said closure and normally disposed flatly there against, and bendable away from said closure to provide a finger piece to be held between the thumb and fingers for supporting the shell, the shell being adapted to be torn away from the opposite end.

1,503,527. Chocolate-Coating Machine. George A. Dumas, Chicopee Falls, Mass. Filed July 10, 1923. Serial No. 650,710. 9 Claims. (Cl. 91—3.)



1. In combination, a machine for coating confections, an inclosing casing having a receptacle therein for receiving a coating material, rotatable disks located in the receptacle and having a portion of their opposite surfaces immersed in the coating material, means for rotating the disks, means for removing the coating material only from the sides of the disks, a hopper to receive the removed material, said hopper having a discharge outlet opening, and conveyor mechanisms for receiving the material to be coated, the conveyor which carries the material to be coated being located below the outlet openings of the hopper, and means for actuating the conveyors for removing the coated confections from the machine.

1,501,659. Candy Mold. Michael M. Haddad, Pontiac, Mich. Filed Mar. 8, 1922. Serial No. 541,916. 1 Claim. (Cl. 107—19.)



A candy mold comprising a pair of longitudinal side members correspondingly transversely slotted to receive intervening spacer sections, a plurality of pairs of intervening spacer sections interposed between said longitudinal members removably receivable at the ends within the slots in the members to form a succession of independent candy-receiving compartments between said longitudinal members, each individual compartment separated from its adjacent compartments by a separate independent spacer section, and end plates notched to be received over the longitudinal side members within a slot thereof to hold said side members in spaced-apart relationship.

Controlling the Weather for Ideal Manufacturing Conditions

by George J. Shaler

THERE is a certain atmospheric condition which is ideal for manufacturing, handling and storing confectionery and the principal raw materials in a candy plant. These ideal temperatures and degrees of relative humidity or moisture content can be maintained uniformly throughout the year by mechanical means. Mr. Shaler discusses the subject of air conditioning from the viewpoint of a practical candy man and not as a technical engineer.

Questions and inquiries of any kind relating to this subject are especially desired; help us direct this discussion so it will solve your individual problems. Kindly bring to our attention any statement or term which is not perfectly clear to you. Every plant manager and practical man in this industry should understand the theory and practical application of air-conditioning and dehumidifying. It is a big factor in the successful and economical production and distribution of confectionery.—Editor.

THE following statements are not such as might be written by a refrigerating or ventilating engineer. They are simply the observations of a practical candy maker inspired by working in conditioned plants and then trying to accomplish during the past few weeks something in plants with no air condition facilities.

If you allow your mind to wander back to some cool, dry, bracing day last winter when you woke in the morning and said to yourself, "This is real candy weather," you will understand what air conditioning really is. It is engineering which reproduces that day every day in your plant.

We all simply acknowledge the need of moguls, coating machines, and refrigerating machines. We must have labor saving machines and artificial cold for the dipping rooms if we are to compete. The time is fast coming when we must all have conditioned air for the same reason. One factor alone, the hard candy room, is enough to demonstrate this. If you loose an aggregate of sixty working days a year on account of bad weather that amounts to three months of unearned overhead as against no lost time for your competitor who is equipped to meet the exigencies of bad weather. That sixty days need not be caused by a complete shut down of the department, but by a few hours here and there spent in cleaning up sticky machines, or by the low production which is explained by saying "Well we did pretty well today considering the weather we were up against."

Then there is the sticky and grained return goods and the lost good-will they cause. It does not seem strange when one has tried to make hard goods under the old and new conditions that "The Other Fellow" can make goods the year round and sell them at the price he does. A plant has to make an awful lot of goods to make up for a lost month or a few hundred boxes of freight collect return goods the cost of which would go a long ways toward paying for the initial cost of installing air conditioning equipment. This is starting out like an advertising booklet but it is not. The times change and we must keep posted on the progress in manufacturing facilities.

The theory of air conditioning is simple, far simpler than the explanations of the average ventilating engineer would lead one to believe. The essentials are all we laymen need but it is difficult for him to see that and separate from the mass of detailed information necessary for the figuring of an installation, those few facts which enable us to take an intelligent view of the whole proposition. After wrestling with the problem for a good while and trying unsuccessfully to explain it to others I believe I am now competent to do so. I have tried it out on those who really know the subject and after a few objections they say, "Well I suppose that is really true but there is so much more that is necessary in planning an installation. They get no further. I am not an engineer and do not intend to plan any installations, however. I want to have the refrigerating engineers fix things so that I can make candy and pack it in the right condition every day and understand in a general way whether or not the machine is doing its best work.

The Principle of Air Conditioning

You can dissolve so much sugar in cold water. If you heat the water it will hold so much more. If you cool it again it will grain; some of the sugar will crystallize out. As it does in crystallizing gums with hot syrup.

Cold air will absorb just so much water before it becomes saturated then nothing in the

room will dry out. There is no place for the water to go. If you heat the air it will hold more but just so much more for each degree its temperature rises. If you cool that air the water will come out again (that's what is meant by dew-point) just as the sugar came out of the syrup but the sugar went on the goods where you wanted it while the water will settle out on any cold surface and if it happens to be candy will make it sticky.

There are many different ways of drying air but the only really satisfactory one is by means of water. This sounds contradictory but it proves out to be exactly the reverse.

It is possible to dry the air in a room by exposing unslacked lime or sulphuric acid to it in open trays. These chemicals have a high affinity for water and will absorb it but the process is slow, so slow that the leakage into an ordinary room will more than offset it and, too, there will be considerable heat liberated which is undesirable.

The fundamental principle underlying all present systems of air drying is the same. It consists in cooling the air to a point where it gives up a portion of its moisture because it is reduced to a temperature below that necessary to the further retention of the percentage of moisture it has in suspension. It is this fact which accounts for the drip from cooling coils or for the ice which sometimes surrounds them. The air immediately around them was cooled to a point below that representing its holding capacity for its burden of moisture and the surplus was deposited on the coil. Just as water would spill out of a rubber bag if you squeezed that bag until its capacity was reduced.

When you blow air over the coils of a cooling bunker the coils gets wet then covered with a thick coating of snow. The air comes out of the bunker cold and apparently wet still we know that it left a lot of the water behind.

There is less water in the whole volume of air when it leaves than when it entered but it is colder and therefore near the saturation point and about ready to deposit more water. If it is heated to the same temperature at which it entered the bunker it feels much dryer than it did before. It is dryer. This is known as relative humidity.

What Do You Mean, "Relative Humidity"

At 70° F. air will hold 8 grains of water. If this air is cooled to 50° F. it will hold only 5 grains and therefore must deposit 3 grains somewhere. If it is reheated to 70 it is capable of again holding 8 grains but has only 5 grains. It is therefore holding ⅝ of its capacity. It is said to be 62 per cent saturated or to have a relative humidity of 62 per cent. At the first 70° it was 100 per cent wet and at 56° it was 100 per cent wet so naturally at the second 70° it felt dryer.

By these figures its is clearly shown that we may have exactly the amount of humidity desired in any room if we saturate the air at a low temperature and then heat it always to the same degree. This cannot well be done in a bunker for it is impossible to keep the coils at an exact temperature or prevent the forming of ice on them. The ice insulates them and changes the surface temperature at which the air comes in contact with them.

We can cool water to a fixed temperature and then spray or otherwise distribute it so that all the air entering the room will come in contact with it and assume the same temperature. According to the 70-56 paragraph above we are going to saturate the air at the lower temperature anyway so passing through the water cannot make it any wetter. When it is cooled below its capacity to hold its burden of water it will deposit it, in this case in the water and so leave the cooling chamber exactly saturated. Now if it is heated to the temperature desired in any given room it will be dryer in accordance with the rise in temperature it has been subjected to. The lower the temperature of the water and the higher that of the room the lower will be the percentage of relative humidity.

In most cases it is necessary to use refrigeration in connection with air conditioning in confectionery plants because their demands have not as yet grown beyond that of the simple reproduction of winter weather in summer. In other industries requiring drying there is a call for exacting temperatures and humidities. In cases where drying must be done in an exact and always definite number of hours or where it is only required that the dust and impurities be removed from the air, the ordinary water supply may well be at a sufficiently low temperature to fulfill all needs. An extremely low humidity is not usually best in a dry room as most candy exposed to such conditions will become hard on the surface and cease drying entirely. The main requisite is to have a large volume of fairly dry air pass constantly over the goods and so remove the moisture by slow absorption giving time for the center of each piece to equalize in moisture content with the surface. The ultimate drying is accomplished in the same time and the resulting product will be better in that it is fixed. If too rapidly dried and a case so formed on the surface the internal moisture will eventually work through, soften the crust and pass out leaving the surface sticky. Certain cases of drying in this way have been called to our attention and the explanation made that the goods were dried to a point where the internal moisture was exactly right for the whole piece and when it redistributed itself the goods were right. It may be possible but it seems unnecessarily hazardous and far from that point of exactness toward which the modern manufacturer is striving in all his work.

Where Air Conditioning Pays

To date, in the candy trade, the greater number of air conditioning units have been established in chocolate dipping and packing rooms. Here the installation of refrigerating coils had

caused an excess of artificial moisture. The refrigeration had caused the trouble so the sufferer naturally turned to the same people for relief. He got it and was satisfied. Undoubtedly the cold rooms need the treatment but not one whit more than nearly every other department of the factory. In some instances it may be cheaper to shut down than go to the expense of air conditioning apparatus. A moderate production of low priced goods would not warrant the initial expense and the operating cost. This will probably be settled in time by more progressive manufacturers taking the bull by the horns and specializing in one or more kinds of confectionery so that mass production under ideal conditions will yield an adequate return on the investment. He will be able to do so by producing and properly packing these goods the year round at a price which kills competition by poorly equipped general line houses.

In the meantime there are the chocolate, hard candy, caramel, nougat, pan polishing and raw material storage rooms where the investment of air conditioning equipment will pay for itself in any plant which produces an appreciable volume of any of these goods.

Take These Factors Into Consideration

There are many angles to consider before ordering an air conditioning installation. Consider carefully your requirements then decide how much you are warranted in spending and the most economical way of distributing the burden over your floor space. To make the foregoing paragraph more intelligible we will treat of the requirements of a hard candy room.

In many types of goods it is unnecessary to obtain a low temperature. In fact, it is easier to work the goods in a room at 80° F. than in one at 68 or 70, but the humidity must be low. For general work, where there is little dust produced, a temperature of 78° F. with a humidity of 55% will answer all requirements.

The room in which the cooling tables are placed should always be conditioned.

Hard candy is peculiar in that there is considerable conditioning going on after it is finished. The moisture content changes. If the humidity is low it will dry out a little more and this is evidenced by its tendency, even in relatively dry air, to take a "first set." When broken apart again it is likely to stay free unless subjected to additional moisture.

If dust is produced as part of the process of manufacture as in cutting with a ball machine having the blades very closely spaced or in seiving the web off shapes made on a drop frame, it is necessary to keep the temperature lower to prevent this "first set" taking place in the dust and so clogging machines and sieves. This can be accomplished by maintaining the room at a point below 71° F. and 51% relative humidity. These also are the best points at which to keep a room in which hard candy is to be packed by machine.

Packing Room Must Be Conditioned

It is well at this point to call attention to the danger of taking goods from a room conditioned in this way until they have been packed and the container carefuly sealed. Not only will the goods begin at once to absorb moisture, but as they will be colder than the air into which they are moved they will act on the air exactly as the cold coils do: they will chill it to a point where it will deposit excess moisture on them and they will at once become sticky. If tightly sealed and then warmed the only effect will be to keep them drier than before for the air in the package will be warmed and consequently its relative humidity lowered.

A tightly sealed package will lengthen the life of any type of goods provided the air sealed in the package with the goods is the best balanced air in which to store that particular goods. If, as in the case of hard candy it is necessary to have a low humidity and the air of the packing room is moist it would be better to send the goods out entirely unsealed. If sealed they would be permanently exposed to moisture, while if left open they might have a chance to dry out.

In settling the question of whether to condition the air in any one department or trust to luck ask these two questions. Is there any special weather condition which assures better goods or bigger production? How much would my profits be increased were this weather to prevail every day of the year?

The matter of how this conditioning is to be accomplished is also of great importance. It can only be intelligently decided by the manufacturer himself after he has become familiar with the various systems offered.

In some plants in this country there is established a central spray cooling unit and the washed air is distributed from this to all departments. Each department has its own requirements and each can be supplied with proper air. It is of no importance what constants are demanded. The cold rooms can have the air as cool and dry as they need it, the hard candy may set its specifications or the crystal drying room may call for air simply free from dust. The machine will deliver its needs to each and more economically than it could do for any one department for by proper mixing and repassing of the air the needs of one can generally be supplied by the rejections from others.

This central system is particularly good in large plants with a balanced continuous production. It may prove too expensive to operate where some departments run at capacity only a few months out of the year.

To meet the need of small plants or those which must increase their production by opening new units at stated periods there are designed small compact washing chambers which may almost be termed portable in that they are designed in fixed sizes and may be erected and moved with a minimum of labor.

If you are to cool chocolates as quickly as they

leave the coating enrober machine, they must be subjected to intense cold and must themselves become cold. If they are taken from the cooling chamber into a room cooled but not with dry air, the film of air in immediate contact with them will be suddenly lowered to a point where it will no longer hold its content of moisture and part of this will be deposited on the chocolate. The disastrous result needs no comment.

The Unit Dehumidifyer

Now, many manufacturers of machine dipped chocolates have several cool rooms each with a battery of enrobers discharging into it. This may be done because of the shape of their building or because it is cheaper to operate a small room when the production requirements are small and to open up additional rooms as the season of large demand approaches. For plants of this type the small unit dehumidifier is ideal as one may be placed in each room, a central refrigerating plant maintained in the engine room and only the necessary power for the actual work being done is consumed.

As to the initial cost of the outfits, they are like any other engineering job. The more that is required of them the more expensive they become. This applies not only to quantity but to quality of the work. If you demand that the rooms be kept constantly within a degree or two of temperature and one or two per cent of relative humidity and that this fine balance be maintained almost independent of human control you can have your demands satisfied, but you will have to pay for them.

If you are content to give the outfit reasonable supervision and will admit of variation provided it does not lower the efficiency of your plant you can save considerable money.

Above all, give the bidders a true, fair statement of what you intend to demand of the outfit and what conditions it will actually meet. They will not then be obliged to figure a 25 or 50% overload to care for unstated contingencies which, while they would not in the event of the installation failing to deliver, fall within the guarantee of the erector, the unsatisfactory condition might seriously injure his reputation.

Consider the Health and Comfort of Employees

There is still another side to air conditioning which is recognized by some manufacturers and anticipated by others. There is a constantly growing recognition of the important relation which exists between production and the human element which enters into it. One side is psychological, but another and equally important one is physical.

The importance of the physical side is evinced by the growing tendency of progressive manufacturers to give at least as much thought and care to the factory conditions in which their employees produce as they do to their machines. True they own the machines and have a direct investment in them, but when they stop to consider the matter of labor turnover they find that it costs about $150 (at least) to hire a man and bring him to a point of profitable production. If many come and go the cost soon rises to that of a machine. The writer is one of those sordid beings who still believes that the average man or woman works primarily for the money he

(*Continued on page* 43)

THE KOSHER KANDY KO.—What Do You Mean "Air Kondishun?"

What Manufacturers of Confectionery Should Know About

Evaporated Milk

by Herbert C. Hooks

DO NOT BE CONFUSED

EVAPORATED MILK is frequently referred to as "condensed milk." This is a misnomer. Condensed milk is a distinct product; a product resulting from condensing a combination of milk and sugar. Evaporated Milk is a product resulting from condensing milk only. Nothing is added. The advantages of using simple, single elements in candy manufacturing are obvious. Evaporated Milk is a single element, containing no added substance, except those with which nature endowed it. Readers will, therefore, bear in mind that Evaporated Milk only is referred to in this discussion of the subject.

ONE of the outstanding movements making for the better nourishment of children and grownups, is the great world-wide effort to increase the use of milk. Much scientific study is being done and the newer knowledge of milk values is being released to the world, not alone by the milk merchants, but by those whose daily work tages the form of doing things for the good of mankind. The milk of human kindness is a phrase of remarkable significanee; it is never more effectively employed than in publishing the newest knowledge of what man should eat to make him physically fit. Newspapers and magazines and the government bureaus, city, state and national enterprises are earnestly co-operating to this end and the result may be in part measured by a six per cent increase in the consumption of milk in a single year—1923.

It is well in accord with the light of this movement that every manufacturer of edibles examine his assortment of products and determine if he is doing his share in putting out products that reach the highest score in nutritive value.

Consider confectionery. Here is an item that is a universal favorite. It can truthfully be said that the energy value of sugar in candy form became general knowledge long after its lasting popularity was assured by taste appeal. The promise of its coming acceptance as a food has been an outgrowth of its first appeal as a dainty—a confection. Its lasting acceptance as a food will be influenced by the efforts of candy manufacturers to keep abreast with the progress of food knowledge. That milk gives "body" and contributes to flavor in candy is well known. A greater contribution, largely overlooked by candy manufacturers, is the increased food value which candy offers when prepared with milk.

In the manufacture of these milk confections care should be taken, of course, to use milk in its purest and most digestible form. Those unfamiliar with the purity and digestibility of evaporated milk and its economy in candy making will be interested in the following statements of fact:

It is said of many men that they have "forgotten more than the other fellow ever knew." There are doubtless many who have forgotten too much, and many who have never heard enough about evaporated milk and its importance to the candy industry. We shall tell simply in a few paragraphs the facts that should not be forgotten, and show the standard of evaporated milk as to *Purity, Economy, Uniformity and Food Value.*

Purity

And first and foremost, any substance used in the manufacture of candy or any other staple food product that has the element of purity has at least one essential quality to commend it.

Evaporated milk is made only from milk that has earned its way into a can by reason of its passing successfully a series of tests that are exact and convincing. The milk manufacturer cannot take a chance. The production and care of milk at the farm is supervised; its transportation to the factory is speedy and accomplished with careful oversight; it is given meticulous inspection at the plant, and its quality jealously guarded in the process of handling thereafter until it is sterile and hermetically sealed ready for market.

The milk itself is the purest in the land; and necessarily so, for the plant owners have not yet overcome the industrial axiom that "you cannot make good products out of poor raw material"—nor will they try to.

Evaporated milk manufacturers vie with each other and with food manufacturers generally in the scientific cleanliness of their plants. The machinery and equipment are models of mechanical perfection, great care being taken to avoid sanitary danger both in construction of the utensils and in the completeness of the cleaning methods employed. The complete absence of bacteria in evaporated milk makes its use in high grade confections particularly desirable, especially in those bonbons which are not boiled.

Economy

A basis for calculating saving in cost is furnished by comparing total pounds of solids in evaporated milk with the total pounds of solids in the same volume of market milk. Thus: 100 pounds of evaporated milk contains 7.8 pounds of pure butter fat and 17.7 pounds of solids not fat. One hundred pounds of market milk contains varying weights of both butter fat and solids not fat but an average of 2.5 pounds and 8.5 pounds of solids not fat is useable.

It is these solids the confectioner must think of in relation to cost and not the liquid measure itself as may sometimes be done. The composition of milk is the true test of value.

It is illegal to sell evaporated milk in a lower fat and total solids content than is here shown and yet market milk may be sold in some states with as low as 3 pounds fat and 11 pounds total solids; while the state whose requirements are highest (Massachusetts) requires 3.55 pounds fat and 12.15 pounds total solids per hundred weight of milk.

Evaporated milk for confectioners use is usually sold in tins containing 8 pounds net; a very convenient size for average need. Each 8-pound tin contains .624 pounds of butter fat and 1.416 pounds of solids not fat making the total solids 2.04 pounds.

The relation of the pounds of fat in each kind of milk—evaporated or market—and the relation of the pounds of solids, not fat, to the price paid for each in various localities will determine the price economy. Nor should it be overlooked that losses, such as spoilage in transit, in addition to irregular solid content are also important considerations when determining the economy of using evaporated milk in the manufacture of confectionery.

Manufacturers can buy evaporated milk when prices are lowest and store it with confidence that its quality will not be impaired when the time comes to use it. It should, of course, be stored in a cool, dry place, but refrigeration is not needed. Moreover, if it is so stored, the owner may use it in just the quantity he desires, without spoilage or waste of the balance.

Uniformity

Manufacturers of confectionery realize the great need of raw materials of uniform composition. Successful manufacturers insist upon high quality and uniformity for these are essential in order to insure a uniform product. With a uniform product one holds satisfied customers. A manufacturer who satisfies consumers with his product is always sure of dependable outlets for his goods.

Uniformity in raw materials is as essential as uniformity in manufacturing processes. From known causes known results may be obtained. Variable qualities of output must be expected when the exact composition of the raw materials is unknown. There should be no variable results from the exact use of a formula.

What occasions a large part of the "seconds" in the output of manufacturing plants? Is it variables in formulas, inaccurate temperature controls or varying timing devices that are responsible, or it is not more often the unknown quantity and quality of the solids and liquids in the raw materials that account for the disasters in the manufactured products of this industry?

Evaporated milk is one of the most exact and controlable products which manufacturers of confectionery use. A pound of sugar and a pound of evaporated milk are definite. They will, when used for their respective purposes, day in and day out, produce definite results of one standard.

Sugar is of definite moisture content and its sweetening syrupy qualities do not vary with different barrels, but each barrel is quite identical with all others in quality and this might also be said of evaporated milk. It is true that one manufacturer may make a better quality of evaporated milk than his competitor, but a scientific examination of both will demonstrate the presence in each of the same fats, proteins and mineral matter. This cannot be said of market milk, which varies with the seasons and the section of the country, as well as the quality of the herds from which the milk comes, for here the fats are high or low, and the milk solids change quite as do the seasons.

Food Value

The first and most important thing to know is that evaporated milk is just pure cow's milk of "double value," and by "double value" I mean that evaporated milk is more than twice as rich in butter fat and all milk solids as is market milk and this is an especially important fact for manufacturing confectioners to remember. It is pure because the utmost speed is employed to bring the fresh milk from the farms and ultimately into the cans. It is absolutely sterile; all bacteria growth having ceased before the evaporated milk leaves the factory. Hermetically sealed in cans, it is free from dust or odors. The United States Government has fixed a definite minimum standard for evaporated milk. It *must* contain 7.8% butter fat. It *must* contain 25.5% total solids. The assurance of this standard for evaporated milk makes unnecessary an analysis by the manufacturer. Any let down in quality is a violation of United States law and the national and state policing of food distribution is your insurance that fats and solids are present in standard quantities.

The Physical Properties of Milk

Milk consists usually of 12.35% milk solids and 87.65% water and this 12.35% milk solids consists usually of 3.6% milk fat, 2.6% casein, 6% albumin, 4.5% milk sugar, 7% mineral matter and 3.5% miscellaneous elements all of which are very important and essential to the life, growth and functioning of the body. There is also in milk those intangibles, the vitamines, which can only be measured in a relative sense, but which are indispensable to life. The fats supply the energy, the other solids make bone tissue and blood.

Evaporated milk contains more than twice the fats and other solids of ordinary milk and its necessary minimum constituents are prescribed by the national and state governments to be total solids 25.5% and water 74.5%. Of the 25.5% total solids, 7.8% must be milk fat and the balance 17.7% is made up of casein, albumin, milk sugar, mineral matter and miscellaneous substances as in ordinary milk, but in quantities exceeding twice those found in ordinary milk. It will be noticed that in evaporat-

(*Continued on page* 44)

The Office as a Production Unit

A discussion of office problems and organization of the general offices in a confectionery plant.

by Ralph G. Wells

Member Committee on Industrial and Commercial Planning, Boston Chamber of Commerce
Member of Faculty, Boston University—College of Business Administration.
Formerly President National Association of Employment Managers.

Exclusively for The Manufacturing Confectioner

OTHER departments may be more important to the success of the business than the office, but certainly none can cause more trouble if it does not function effectively. A smooth-running office is a valuable asset, particularly in the confectionery industry, where so many details must be handled and followed up closely. It facilitates the work of other department and frees the proprietors from worry about details and routine matter, so that uninterrupted attention can be given to important affairs.

Furthermore, customers and the general public come in contact with the office more than with any other department. If it runs smoothly and efficiently, they are favorably impressed. If, on the other hand, the office force is frequently making mistakes, neglecting details, sending out poorly written letters, and giving other indications of poor management, customers get an unfavorable impression of the firm and are likely to assume that the manufacturing methods are similar to the office methods.

Therefore, candy firms give considerable attention to laying out and arranging offices that will create a favorable impression, and to organizing the personnel and working methods in order that work will be carried along promptly and efficiently.

Office a Manufacturing Department

In discussing this phase of his business, one manufacturer said: "We think of our office as a manufacturing department. It is turning out a definite product of letters, bills, invoices, records, reports, sales orders, and a variety of other products which are essential to the successful conduct of our business. We, therefore, pay as much attention to the proper functioning of the office as to that of any department.

"An office has its own peculiar raw material, its own working force, its machines, it production centers, and its working methods. If it is to run successfully, it must have schedules, plan performances, standards, inspection, supervision, and, above all, must co-ordinate and cooperate with other divisions of the plant so as to facilitate their work."

When manufacturers begin to think of their offices in this light, they realize that the same management rules apply to its operation as to the running of any other production department. One firm has made a careful study of the location, layout, and arrangement of offices, of physical equipment, and facilities. It has analyzed the work to be done and time-studied the individual operations, building up in this manner standards of performance and a job analysis which indicate the type of employe best suited for particular office jobs. Furthermore, studies have been made of the flow of work through the office and of the amount that should be done by each person. This permits the laying out of definite schedules and enables the office manager to know exactly how much work it is reasonable to expect from the different members of the office force. Such knowledge facilitates discipline and control, and, furthermore, serves as a basis for the installation of piece rate methods of payment, together with a bonus for extra accomplishment and penalties for too frequent errors, to insure work being done more promptly and with less error than previously.

All of this sounds much more imposing and elaborate than it really is. It has not resulted in increased red tape, but, on the contrary, has simplified much of the office routine and enabled the firm to do away with many complexities that had been installed in previous years by so-called experts.

From the experiences of numerous firms it is clear that it pays in many respects to make a careful study of various phases of the office problem, in order to make improvements, simplify methods, and reduce office work to a practical, commonsense working basis.

Unfortunately, in years gone by, offices were the first point of attack of "efficiency experts." Wherever they went, they left behind them a bewildering mass of forms and systems, traces of which are still found in many offices today. Simplification, rather than more system, should be the goal of any up-to-date office manager.

Try This

As an illustration, try out this suggestion if it has not already been done: Have someone collect samples of all of the different forms used in the office and in various parts of the plan

bring these together, pasting them either in a large scrap book or on large sheets of stiff paper, so that they can be hung on the wall. You will probably be surprised at the number of forms. Then call a conference of your executives. After they have examined the collection, take up each form and ask the following questions:

(1) What is its purpose, and what happens if a clerk forgets to make it out?

(2) Suppose its use were discontinued entirely—is it absolutely essential? Can we do without it?

(3) If it is essential, can it be simplified or combined with any other form now in use?

Surprising results have been accomplished by such a study. The writer knows of one instance where this method was tried and forms in a given department were reduced from something over thirty to seven forms used regularly and three or four more held in reserve for special emergencies.

Problems Classified

In studying the office problems of a candy plant it will be found that the various phases can be classified as follows:

(a) Location, layout and arrangement.
(b) Physical equipment and working facilities.
(c) Office organization and personnel.
(d) Working methods and standards of performance.
(e) Working schedules, systems and office routine.
(f) Working rules and regulations.
(g) Methods of control and supervision.
(h) Wage systems and bonus plans.

In visiting various candy plants the writer has been impressed with the similarity of the methods used. For this reason it seemed that a detailed or lengthy explanation of such methods would mean merely the repetition of information which readers of the magazine already possess. Instead, there is given below a summary of the general practices as found in several plants. In this condensed statement the writer has brought together some of the more interesting practices found.

Location, Layout, and Arrangement

Little need be said in regard to the location and layout of office, as this problem is pretty well settled in nearly all plants and so much has been written on the subject. Occasionally the manufacturer, in remodeling or moving to a new plant, has an opportunity to make such changes and alterations as will facilitate the flow of work.

Considerable improvement has been made in recent years in the location and layout of offices. More attention is being paid to light and ventilation, to freedom from noise, dust and odors. Perhaps the most marked improvement in recent years has been the careful planning of the layout of the office so as to bring together those who must communicate most frequently with each other, and to have files and records easy of access to those who must refer to them frequently.

Study the Flow of Work

It will pay anyone who is in charge of the office work of the candy factory to study the flow and routing of work through the office. This can be done easily by drawing upon cardboard a floor plan of the office on reduced scale, then by means of cut-outs, drawn to scale, representing the different pieces of furniture and the desks, the equipment may be accurately located to show the existing arrangement of the office. With pieces of colored string trace the route of papers from desk to desk to indicate the flow of work through the department. Frequently this study of the route followed by correspondence, orders and other papers, will show places where it is possible to avoid duplication, backtracking and loss of time. Study the frequency with which different members of the office force must communicate with each other. Often considerable time can be saved changing certain clerks to a more central location.

Physical Equipment and Working Facilities

While studying the layout and arrangement of the office, give attention also to the physical equipment. Perhaps it is inadequate or out of date. There are so many time-saving devices available today that opportunities for savings may be lost sight of unless the possibilities of such devices are studied systematically.

A list of the worth-while labor-saving devices for offices would fill many pages. They are worthy of serious consideration. Many manufacturers think that only the larger firms, maintaining the more elaborate offices, are justified in putting in extensive equipment. This is a mistake. The up-to-date proprietor of the moderate-sized establishment finds that wise investments in labor-saving equipment enable him to keep down his office overhead. The carrying charge of labor-saving office equipment is small when compared to salaries, especially in dull periods. It is cheaper to increase capacity with machines than green help.

Watch Your Desks

Since the desk is the individual production unit of an office, it should be viewed in the same light as a machine. Some firms have found it desirable to establish fairly definite rules for the operation and use of desks.

One rule is: Never use roll top desks if they can be avoided. The only excuse for a roll top desk is in the case of an executive doing confidential work who must have his papers spread out and who may be called away at any time, so that he cannot stop to clear up his desk. Whole chapters could be written on the evils of the roll top desk from the standpoint of the average clerk. It encourages untidiness, delay, neglect, and is frequently the cause of lost papers.

All papers should be cleaned off of each desk each night.

The contents of the desk drawers should be arranged according to a well-understood plan.

Ordinarily, the narrow center drawer of a desk becomes a catch-all, but by providing proper partitions it can be turned into a great convenience, so that the user may keep there all of his necessary items. It is a good plan to keep either the upper left or right-hand drawer absolutely empty except for current papers that are being worked on at the time. Such a drawer should be cleaned out daily, and nothing allowed to remain in it for any length of time.

One can easily judge the effectiveness of a clerk or executive by the way in which he keeps his desk during the day and its appearance after he leaves.

Office equipment should be selected with as much care as is used in buying machines for the factory. Desks, chairs, tables, filing invoice books, stationery, and other office supplies, are made in a wide variety suitable for many different uses and tastes. One can nearly always find exactly the type best fitted to his work.

Office Organization and Personnel

Considerable space has been devoted in previous articles to a discussion of the personnel problem. Much of the material applies directly to the selection, training, and organization of the office force. There is no more important problem in the management of an office than the development of an effective working force. For this reason the reader is referred to the following articles in previous issues of "The Manufacturing Confectioner":

"Organization and Personnel Problems"—October, 1923.

"Organizing to Save Time"—May, 1924.

"Selecting Assistants"—July, 1924.

For the benefit of readers who may not have the October number of "The Manufacturing Confectioner" easily available, we are reprinting below from page 25 of the October issue the following condensed summary of the article:

Steps in Developing an Organization

1. Determine work to be done.
2. Classify and group by departments.
3. Subdivide into individual jobs.
4. Determine how work shall be done and standardize.
5. Define clearly exact duties and responsibilities of each department and each employee.
6. Have clear understanding as to lines of authority, to whom each person is to report, who has authority to give him instructions, and the limitations of each employee's authority.
7. Determine the most desirable type of person for each position.
8. Choose carefully the best available applicant and select with view to potentiality and general fitness as well as with reference to special qualifications.
9. Fill all vacancies from within the organization as far as possible. Have definite system of promotion to insure development of employees to secure their loyalty.
10. Establish comprehensive methods of training and instruction to insure adequate preparation of employees for positions ahead of them.
11. Keep a supply of younger men in training in order to insure an adequate supply of material for key position.
12. Provide capable direction, supervision and control. Encourage initiative and self-reliance.
13. Co-ordinate and balance the functions and activities of all departments; eliminate duplication of effort and conflict of authority.
14. Maintain harmony, stimulate unity of action and purpose, and insist on hearty and loyal co-operation.
15. Provide definite plans and schedules of work programme.
16. Avoid friction, petty jealousies, cliques, internal politics and other obstacles to team-work and company loyalty. Eliminate promptly any who cannot function properly as member of the organization.

It is particularly essential in the office that the lines of authority and responsibility should be clearly understood. There is something about the psychology of the average office worker that develops a tendency to petty jealousies, to shirking responsibilities, and to doing only those things that cannot be avoided. For this reason many firms have found an office manual desirable to avoid misunderstanding and confusion, and for the purpose of standardizing practices and training employes.

It is a peculiar trait of human nature that unconsciously we change our methods almost imperceptively. If at any time we compare the method in use with the practice established two or three months previously, we shall be surprised to find the difference that exists. This is particularly true where instructions have been passed along by word of mouth. This has forced more than one manager to the conclusion that the only way to insure against instructions being misunderstood and distorted is to reduce them to writing, and have copies easily accessible to anyone.

Apply Time Study Methods

Naturally, the first step in determining exactly what each office worker is to do and in fixing duties and responsibilities clearly is to analyze the work to be done and study each job individually. Remarkable results have been secured by certain firms who have used time-

study methods in improving office operations. Instances can be cited where the effectiveness of individual office workers has been increased 50 to 60 per cent as a result of a careful study of the methods used, the arrangement of their desks, and the order in which work is handled. One well-known company increased the efficiency of the individual clerks in an over-worked department to such an extent that it was possible to reduce the working force in the office and to turn out more work in less time than had been accomplished with a larger number.

Marked success has been achieved in increasing the output of office workers by the installation of piece-rate and bonus system. One firm has established piece rates in its bookkeeping, filing and mailing departments. After studies have been made to determine how much work a clerk could handle accurately in a given time, piece rates were established, so that each office worker could easily earn his regular salary if he performed a reasonable amount of work.

Then as an incentive to increased efficiency and to the handling of a larger volume of work during rush periods, a bonus was offered for additional work done in any one day.

This bonus system has accomplished several things:

(a) Work is done much more rapidly and is nearly always cleaned up each day.

(b) During vacation periods it has been unnecessary to hire extra office help as was formerly necessary.

(c) During rush seasons practically all overtime work in the office has been eliminated, and it is seldom necessary to bring in "green" clerks to handle the additional volume of business. This saves the expense of training "green" employes, avoids the disadvantages resulting from their many mistakes, and makes the older office workers more satisfied, because they are given an opportunity to earn extra money during the busy periods.

If any manufacturer is having difficulty in getting his office work done promptly, or finds it necessary to put on extra workers during rush periods, it will pay him to transfer his time-study man from the factory to the office for a while, and to see whether it is not possible to make changes in working methods and to install a bonus system which will increase the effectiveness of his force. Sometimes valuable pointers along this line can be picked up from banks, department stores, or public service corporations. Many of them have been paying considerable attention to this method of effecting improvements in the working methods of their offices.

(Additional information in regard to piece rates and bonus systems for office employes will be supplied without cost by THE MANUFACTURING CONFECTIONER *to readers on application.)*

Experience has shown that in the selection of office employes certain working tests are helpful in determining the employe's accuracy and capacity for certain types of work. Outside of the candy industry many firms have found some of the so-called mental tests effective when used by someone who is a recognized expert in this line. The average concern, however, cannot afford to go to all this expense, but it is a simple matter for anyone familiar with office work to develop a few working tests which will give a fair estimate of an applicant's capacity for a certain position.

A few typical letters can be dictated to girls applying for positions as stenographers. Perhaps they can be given a rather complicated statistical report to copy, as a test of accuracy. Those asking for bookkeeper's or accounting positions can be asked to show how they would go about closing a set of books or taking off a trial balance. It is sometimes a good plan to give such applicants a few mathematical tests, in order to determine the rapidity and correctness with which they do their work. Applicants for clerical positions can be tested out by having them try to perform certain office operations for a stated period, in order that the interviewer may get an idea of their dexterity.

Train Office Employees Well

Perhaps in no other department is it so important that employes should be well trained. Even the smaller firms find that it pays to work out a list of instructions for each job and to see that the new employe is thoroughly familiar with his work. A little time spent in this way reduces the likelihood of mistakes and makes close supervision unnecessary. Readers interested in this phase will find additional suggestions on training in the article mentioned above.

Develop Morale

Morale is an important factor in the effectiveness of an office force. Office employes are in such close contact that, unless the right spirit exists among them, the office will be upset with petty jealousies, cliques, and other unpleasant conditions. This is another reason why it is so important to have a clear understanding as to duties and responsibilities and lines of authority. More than this, however, it is desirable for the proprietor or office manager to make a conscious effort towards building up an esprit de corps by such means as are at his disposal.

Working Rules

One of the first steps in outlining the work of the organization is the issuing of general rules governing the work. It is better to have these rules typewritten or mimeographed so that copies can be placed in the hands of each employe. These rules should include statements as to office hours, importance of prompt and regular attendance, rules covering absences and tardiness. Overtime, vacations, and holidays should be mentioned together, as office employes should understand that, since they are on a different footing from those in the factory, and receive full pay during vacations, holidays, and sickness, they are not entitled to payment for overtime under ordinary circumstances. It seems to be the usual rule among firms not to grant vacations to employes who have been with the company for less than six months. Em-

ployes of less than one year's standing receive one week's vacation, while those who have been with the company more than a year generally receive two weeks with pay.

In many sections the vacation problem is solved well by closing the entire plant down for two weeks during the summer months.

Other subjects which should be covered by rules relate to wage payments, deductions, loans, and advances, and the importance of notifying the office of any change in address. One problem which is more or less troublesome is the question of personal calls from visitors or by telephone. It is a growing practice not to allow office employes to receive personal visits or telephone calls during office hours. It is also preferable that personal mail should not be addressed to the office. While more latitude in such matters must be given to executives, nevertheless the rule should be made to apply to everybody in the organization.

Some firms go so far in their laying out office rules as to issue definite instructions regarding desk arrangements, the putting away of all papers before leaving, the requisitioning of supplies, fire drills, proper telephone usage, communications and conversations between employes, and the importance of returning all papers to the files promptly.

Division of Office Work

One firm has found it desirable to divide its office work into the following divisions:

(1) *Administrative*—This includes all general correspondence, files, records relating to financial and insurance transactions, firm and customers' accounts, credits, statistics, and similar matters.

(2) *Sales and Advertising*—This division handles all the work and correspondence connected with sales and advertising. It receives and makes out all customers' orders, filling in prices, terms, and shipping instructions, but does not extend the totals. These orders are made out in triplicate and are then passed on to the credit department for credit O. K. If the customer's credit is satisfactory, a copy then goes to the shipping clerk. Where the credit is not satisfactory, the order is returned to the sales department to be held while the credit department is making its investigation. The sales office also sends out all advertising matter, handles sales correspondence, and keeps sales records and statistics.

(3) *Factory*—This division handles all the routine and detail work for the production department, including the making out of manufacturing orders, the keeping of production and stores records, cost accounting, payrolls, shipping and distribution of goods. Such clerical work as is done in the plant is under the control of this office. In some of the larger departments they have found it worth while to give the foreman a clerk whose duty it is to keep up his production record and handle any clerical routine required of him. Perhaps the greatest advantage that has come from the work of these clerks has been the savings in labor cost. These clerks check each day the production records against piece-rate slips, to make sure that the firm does not pay for more work than is actually turned out. Previous to putting in these clerks it was not an uncommon thing to find that in certain departments the number of pieces paid for was greater than the number actually turned out.

(4) *Purchasing*—While the purchasing department in this plant is closely allied with the factory, nevertheless the purchasing agents and assistants have so much correspondence that it has been found desirable to segregate their office details. This division handles all the purchasing agent's correspondence, keeps track of quotations, files advertising matter, catalogues, follows up purchases to see that goods are shipped on time, handles all the traffic work in connection with both incoming and outgoing shipments, and checks invoices for accuracy.

(*To be continued in the October issue.*)

The second half of Mr. Wells' article consists of a detailed description of a typical office system in use in a successful moderate sized confectionery plant. The next issue is our regular annual Purchasing Number and other discussions will be suspended or condemned to allow a concentration of thought on the subject of "Buying."

The Manufacturing Confectioner's BLUE BOOK SUPPLEMENT

THE purpose of this department is to supply current information which will supplement the data published in The Blue Book in the interim between its annual editions. New products, new sources of supply, new statistics and reference data, corrections, etc., are published monthly in this department to be clipped out and pasted in their proper place in The Blue Book for permanent reference.

Correct Page 348, The Blue Book

NATIONAL CONFECTIONERY SALESMEN'S ASSOCIATION OF AMERICA
Newly elected officers for 1924

President: FRED EMME.
Vice President: FRANK FUTER.
Secretary-Treasurer: A. E. SANDER, P. O. Box 562, Lancaster, Pa.

(NOTE: The line reading "Wilmington, Delaware" under the name of the association is a typographical error—cross it out.)

Add to Page 134, The Blue Book

CORN FLAKES
For Coconut Work

J. R. SHORT MILLING CO., 3739 Wall St., Chicago, Ill.

See their advertising in **THE MANUFACTURING CONFECTIONER.**

Correction Page 304, The Blue Book

CONSOLIDATED STEEL STRAPPING CO.
(Successors to Signode System Inc., and Twisted Wire & Steel Co.

(The above line should have appeared directly under the firm name and above the line reading **"Manufacturers of Packing Reinforcement Supplies."**

Add to Page 349, The Blue Book

ASSOCIATION OF RETAIL CONFECTIONERS OF NORTHERN NEW JERSEY
Secretary: FRANK MUELLER, 265 Jackson St., Jersey City, N. J.

Add to Page 351, The Blue Book

BIRMINGHAM CANDY JOBBERS' ASSOCIATION,
Birmingham, Alabama.
President: A. S. WYNN.
Vice President: GEORGE L. MARTIN.

Add to Page 352, The Blue Book

DAYTON CANDY JOBBERS' ASSOCIATION,
Dayton, Ohio.
President: ED. BECKER.
Vice President: JOHN FRISSINGER.
Secretary-Treasurer: TRUMAN TALMAGE.

NEW YORK CANDY CLUB
President: RICHARD S. BOWLES, E. Greenfield Sons.
Vice President: J. C. HARRIS, Rockwood & Co.
Treasurer: MAURICE FLEISCHMANN, Ridley's.
Secretary: GEORGE WEINBERG, Robt. F. Mackenzie Co.
BOARD OF DIRECTORS: Milton M. Cohn, Nestle's Food Co., Herman Eitelberg, Shapiro Candy Co.; David McGarry, Griffith Candy Co.

(Copies of The Blue Book are being shipped as fast as they are received from the bindery. All subscribers should receive their copies within a few days of the delivery of this August issue.)

Planning the Routine of the Group Conference

The seventh of a series of twelve articles on Foremanship

by J. K. Novins

HOW many foremen should be assigned to a a group?

As a general rule the smaller the group the more effective is the instruction. In a lecture course a hundred or more foremen may benefit by attendance, but the number of men assigned to a group under the group study plan rarely exceeds 15 men. A larger number may interfere with the proper discussion of individual problems.

In one plant the foremen-students are grouped in six sections of from 25 to 30 men in each group, but in the great majority of cases the number falls below that figure. In another plant the group varies from 6 to 20 men, depending on the nature of the course. In the beginners' course the latter figure is a safe one, as there is a great deal of lecture work. As the instruction becomes more intensive and individualized the group will diminish in size, most probably breaking up into smaller groups. In many plants the 15-men group is the largest handled. In one plant the foremen are assigned to nine groups, 12 men to a group. In another plant the group limit is 16. In still another plant the group is limited to 10 men.

Announcing the Course

How should the training course be announced to the factory foremen?

In some plants the president of the firm will issue a signed call for candidates. This is to impress the foremen with the importance of the contemplated training. The president's call is either in the form of a mimeographed letter addressed to the foremen individually, or in the form of an announcement posted in a conspicuous place on the bulletin board. In the announcement should be stated clearly the date the course is to start, the number of hours to be devoted to the study, and if possible it should tell whether the instruction will be during the day or during evening hours. Mention should be made if there is any expense involved by the students, and the number that will be accepted for the training. It should also give the closing date for applications. A reasonable time is to announce a month in advance of the opening date of the course.

In many plants the call is signed by the employment manager, who, before posting his message probably makes verbal announcement to foremen at get-together meetings or during luncheons. He may approach foremen individually, interesting especially those he deems proper candidates for the training.

The First Meeting

What should be the program for the first meeting of the group?

A good time should be had by all! The men should be given a supper party, with a little music thrown in. The officers of the firm, possibly the president, should be on hand to deliver inspirational talks to the foremen. The foremen should be impressed with their importance in the plant and the influence they may bear on the future of the business. The supervisor of instruction will then deliver a talk, outlining the scope and purpose of the course and explaining in just what ways the foremen will benefit by the instruction. Addresses by executives of the various departments will impress the foremen with the importance of interdepartmental cooperation. The students should be furnished with mimeographed or printed outlines of the entire course of study with a list of books to read.

Who should arrange the program for each meeting?

As a general rule, the factory executives arrange the programs for the individual groups as well as secure the necessary speakers. In other plants the programs are arranged by a special committee consisting of employment manager, superintendent and several other executive officers. In the more democratically managed plants the programs are arranged by the Occupational and Rights Committee from data submitted by the shop supervisors.

The students should be furnished in advance with mimeographed outlines of each meeting, preferably a week or two in advance. They should also be instructed on reading matter relating to the subject to be discussed at the forthcoming meeting.

Foremen's Instruction Book

The foremen should be instructed to read carefully their Foremen's Instruction Book, which contains the company rules and general managerial policies. As this book is sometimes prepared in loose leaf form the students can add new regulations from time to time. The students are told to make constant reference to the Instruction Book, as with each weekly conference they will be in better position to interpret the regulations.

Each student should carry a looseleaf note book in which to enter notes and ideas gained during the conference meeting. The practice of entering notes on odd pieces of paper or on backs of envelopes should be discouraged. The note book should be a permanent

record of the course. Some instructors have adopted a policy of discouraging note-taking during the conference, preferring that the students give their entire attention to the discussion. In this case the instructor dictates some brief notes toward the end of the meeting. The trained instructor will be able to dictate intelligent summaries of the entire meeting's discussion in fifteen minutes. If possible the foremen should have separate note books in which to do the home-work problems.

What should be the routine of the conference?

In one plant the plan is as follows: The employment manager, who has charge of the training of fifty foremen, delivers a talk, illustrating it with problems that have arisen in that plant. A general discussion follows. The conference is then broken up into six groups of eight men each. Each group retires to a separate room to discuss phases of the problem that interest the individual groups.

In another plant the conference starts with the reading of a paper. This consumes a half hour. A general discussion follows. The one assigned to read the paper had a week previous furnished each foreman with an outline and a list of reference readings so that, together with their personal experiences, the men can discuss the subject intelligently.

One plan provides for a fifteen minute talk by the director on the subject, followed by an open discussion among the foremen. The leader puts definite questions before the group members. Here are some of the typical questions:

"In what way does management help the foremen?

"What is the relation of system to organization and administration?

"What are the types of men needed for planning and execution?"

The Case System

In the standardized course the case system is used. In his preliminary talk instructor or leader presents a number of experiences in management in the plant and he then asks the students to give their solutions to the problems. The text-books used in the standardized course, supplied by the outside educational institution, also treat the subjects by cases. The reading assignments inform the students of the facts in a particular case, the subject is treated further in the leader's talk, and then it is up to the men to give their solutions.

In presenting a typical case the leader should use fictitious names, yet he should be careful to make the circumstances appear as real as possible. The students should imagine themselves involved in a similar situation. In that way their interest is aroused. After stating the facts, the leader puts the problem in the form of specific questions. The foremen are expected to consider the questions from the point of view of what would be the wise, human and logical thing to do under the circumstances. The leader should not state his own opinion, although he might suggest several possible solutions, in which case he calls upon foremen to give their reasons why a certain solution appeals to them most. After discussing the suggested solutions they will then present their own solutions.

Home Work

What kind of home work should be assigned?

In addition to reading assignments, the foremen should be assigned definite problems arising out of the previous meeting. It is a bad policy to load the foreman with home work. Never should it take more than an evening of his time.

Here is a typical set of problems assigned as home work exercise to a group of foremen in a certain plant:

"The transfer of an employee from one position to another sometime brings up questions as to whether certain transfers should be made. Consider the following points:

"1. Would you transfer a new employee from his first position, on his request, if the department had reported that his work and attitude were not satisfactory?

"2. Would you transfer a satisfactory employee in certain work if she decides that she would like to try some other work to get a change? (This occurs more often in case of women.

"3. Would you transfer to other work, at his request, an employee who feels that he will never be contented in a certain department?"

Keeping the Foreman Interested

What should be done to keep up interest in the study?

After several meetings students may show a tendency to lose interest. One or two may be absent, and then drop out entirely. There will always be the problem of maintaining the original enrollment. However, the situation is not so bad as is imagined. According to reports by twenty-eight representative firms giving foreman instruction to its foremen, out of a total of 2,374 foremen taking training in groups, 361 dropped out before the courses were completed. This means that only 15 per cent of the students in these plants dropped out. Not a bad showing, by any means!

The chief reason why men drop out is neglect to follow up two or more meetings. The student then says, "I missed the last couple of meetings. Well, what's the use of continuing." He does not find it difficult to invent some excuse to stay away entirely. One remedy is to get after the absentee before he becomes chronic. If he has missed one or two meetings you might arrange for some special coaching to enable him to catch up with the work. Another method is to hold a little sociable every month or so, when the foreman can invite his wife. Another still is to give the men a written examination every month or so, in which case he knows that he must attend every meeting and follow up the instruction faithfully. The men are asked to write down suggestions regarding management in their respective departments, in the light of what they have learned in the group.

If an advanced course is to be offered upon completion of the regular one the management should not wait until the last session of the first course to announce the subsequent one. It should be announced a reasonable time before the completion of the course and the announcement repeated at every meeting of the group during the remaining sessions.

Insure Against Loss and Damage

by John F. Keeley

Assistant Chief, Transportation Division, Bureau of Foreign and Domestic Commerce

IN AN EFFORT to reduce the waste resulting from loss and damage to freight shipments, which last year amounted to nearly 50 million dollars, the railroads of the country, through the medium of the Freight Claim Division of the American Railway Association, have inaugurated a campaign to last throughout June to encourage the use of box strapping on shipping containers. While the average shipper may at first consider this a move solely in the interest of the rail carriers, he will on reflection be convinced that the campaign is primarily designed to aid in economy and efficiency in shipping, which will result in lower distribution costs, box strapping being, in effect, an insurance against loss and damage. There is no problem in our economic life today of more importance than that of distribution, and any move designed to lower its cost and increase its efficiency should have the careful attention of manufacturers and shippers.

In the first place, scientific tests made by the Forest Products Laboratory on over 2,000 nailed wooden boxes of various sizes and shapes, loaded with different contents, and varying in weight from 60 to 800 pounds, proved that the thickness of the sides, tops and bottoms of wellbalanced, properly constructed nailed wooden boxes, possessing adequate strength and serviceability without metal bindings, may be reduced 20 to 40 per cent when box strapping is properly applied, without any reduction in the strength of serviceability of the shipping container. It therefore follows that the use of box strapping results in a stronger yet lighter shipping package, and in lower freight charges—the latter in the aggregate being an important item to shippers and consignees.

Preventing Pilferage

Perhaps one of the most important results of the use of box strapping is the effect it has in preventing pilferage. These concealed losses, as they are called, are a source of great expense and considerable trouble to the rail carriers, but in a wider sense they are an annoyance to both the shipper and consignee. The latter, expecting to receive a stipulated quantity of goods to sell, of certain sizes and qualities demanded by his trade, and on which he hopes to realize a profit, perhaps finds that only a portion of his goods arrives. Endless confusion and correspondence results and it is months before the transaction can be completed. Large shippers, ever on the alert for improvement in shipping containers, have found box strapping not an additional expense but a real economy for the following reasons:

It strengthens containers and permits reduction in the dimensions of lumber used in box or crate construction, resulting in lighter containers and lower freight costs.

It keeps out the pilferer and makes his task next to impossible.

It insures the safe arrival of goods, satisfied customers and completed business transactions.

It makes the filing of claims for loss or damage unnecessay, saving in clerical help and interest on outstanding claims.

Its cost for material and labor is small and it actually lowers shipping costs.

THE COMMITTEE ON FREIGHT CLAIM PREVENTION,
Lewis Pilcher, Secretary.

Self Supporting Straps

Use of Metal Box Binding No Longer Considered Added Shipping Room Expense—It Saves Lumber and Prevents Losses

THE USE of metal box strapping is no longer considered an additional shipping room expense, says J. F. Keeley, packing expert of the Department of Commerce. Exhaustive tests have proved that the metal strap pays for itself from the start by making it possible to use thinner boards in making boxes, saving shipping weight as well as lumber, to say nothing of its subsequent efficacy in decreasing pilferage losses and other shipping hazards. Sides, tops and bottoms of boxes may be reduced in thickness by as much as three-eighths of an inch if enough straps are used and the box will be stronger than the unstrapped box of thicker boards. Railways and express companies and shippers have confirmed one another's testimony that losses in transit have been materially lessened in the past two or three years by increased use of straps, safe delivery, insuring completed business transactions and satisfied customers.

For these reasons, the Department of Commerce not only advocates the use of metal box strapping whenever possible, but it hopes to extend that use by disseminating the following rules, compiled by the Forest Products Laboratory at Madison, Wis.:

Nailless Strapping

Only unannealed straps should be used. Material wider than three-fourths of an inch or thicker than 0.023 inch is not ordinarily used. It is suggested that one or two straps be used on all sizes of boxes of the ordinary proportions and weights. Three straps should be used on relatively long or heavy boxes. The same total strength of strapping is recommended for three as for two straps, and the same reduction in thickness of box material is permitted; but when one strap is used it should have 60 per cent of this total strength, and less reduction in thickness of box material is permitted.

The ends of nailless strapping should be joined in such a manner that the joint will have not less than 75 per cent of the strength of the strap. When two or three straps are used one should be placed approximately one-sixth of the length of the box from each end.

Nailed Strapping

Either annealed or unannealed straps may be used. The box should be nailed in accordance with the nailing schedule recently issued by the Department of Commerce. One strap should then be placed around the box at each end and nailed to the end with the same sized nails, but spaced twice as far apart.

Tightening of strapping; protection against rust—All strapping must be drawn so tight as to sink into the edges of the box.

Strapping for boxes for export shipment should be galvanized or otherwise treated to protect them against rust.

Charts showing the size of straps to use and the size number and positions of nails necessary will be supplied by the Department of Commerce on request through any district or co-operative office of the Department or on application direct to the Transportation Division of the Department in Washington.

Controlling Weather Conditions

(*Continued from page* 31)

gets and not necessarily for the beauty of the plant and sanitation of its appointments. It is an uncontradictable fact that they weigh the wage against the discomfort and not the comfort of their working condition. We accept comfort but we rebel against discomfort.

The hottest or most disagreeable department in a confectionery plant is a joy compared to the stoke hold of a vessel or the open hearth steel plants. Still there is a constant irritation about working in the molding rooms or enrober feed rooms. Why is it? Largely because there is generally a high percentage of humidity and very poor ventilation. By reducing the humidity with heated discharge air from the cool room this condition can be entirely overcome and the temperature made scarcely noticeable by those who must bear it.

This consideration of the comfort of the worker is rewarded not only by reduced turnover, but by an immediate increase in individual output. Few men work as efficiently on a hot humid summer day as they do on a bracing day in autumn. We, of the temperate zone, grow completely disgusted with the indolent ways of those in the tropics and many have gone south to hustle things up. Perhaps they did for a while then either one of two things happened —they slowed up or died.

Conditioned air is ideal for health and comfort and should be a requisite in every food factory if for no other reason, and after you have conditioned the production department don't forget the office. Cool, dry air for the office during the sweltering days of the year will pay real dividends in form of increased results.

WHAT'S YOUR PROBLEM?

PD-53.—I am very anxious at this particular time to get the latest information and most successful method for glacing pineapple slices, particularly for preparing pineapple that will be tender, well flavored and with good keeping qualities.

Glace Pineapple Slices

Select slightly under ripe fruit and slice ½ inch thick on bread slicer. Remove the rind with a circular cutter having one for the large and one for the smaller slices. These cutters are shaped like an old fashioned biscuit cutter. Do not remove the core at this time.

As the slices are cut throw them in cold water until all are ready. Put water and fruit on the fire and boil until tender. That is until they can be easily penetrated with a wood tooth pick.

Allow to cool slightly then drain and place in shallow crocks.

Put ten pounds of sugar, four pounds of corn syrup and three pints of water on the fire and boil to 32° Baumé then pour it over the pineapple slices. These figures are the proper proportion but the quantity of syrup can only be determined by the amount required to cover the fruit.

Allow to set for 24 hours then pour off the syrup into a copper pan, replace on the fire and boil to 33° B. and pour back on the slices.

Allow to stand another 24 hours then drain, boil syrup to 34° B. and return to the crocks.

Repeat again after 24 hours bringing the syrup to 36° B., but this time put the slices into the 36° syrup and bring to a boil, then pour fruit and syrup into the crocks and cover by tying a paper over the top of each crock.

As the glaced slices are required removed the contents of one crock cut out the cores and drain the fruit carefully. The fruit and syrup will drain better if heated on removal from crock.

Glace

Put five pounds of sugar and 18 ozs. of water in a pan and cook to 238° F. Remove from fire and start grain in one part of the pan by rubbing. Stir the grained portion through the rest then put the slices in the syrup, mix through, then spread them out on a sieve to dry.

PROBLEM NO. 999
"My Kingdom for an extra repair link."

Evaporated Milk

(*Continued from page* 33)

ed milk 74.5 pounds of water is received with the purchase of 25.5 pounds of solids; while in ordinary milk 153.47 pounds of water is received with the purchase of the same pounds of solids and the handling expense of ordinary milk is thereby increased very materially.

Conclusion

The value of any substance as a food is measured by its contribution to the needs of the human body. The quickly released energy value of sugar has been proved time and again, in athletic contests, in the hardships of war and the deprivation of exploring expeditions. To this highly kinetic energizer add milk, the perfect food in its most easily digested form—evaporated—and there results not a confection merely but a food which satisfies not only for the moment of need, but builds a complementing reserve for future strain.

Confectionery manufacturers might well give heed to the trend of the times and cater more largely to the growing appreciation of milk value. In the great nation-wide "Drink More Milk" movement children are urged to consume a quart a day, if not as a drink, then combined in their daily food.

The confectioner who gets behind this general movement and advertises the fact that his product is not only pure as to raw material and manufacturing method, but beyond this is a satisfying food confection since it combines the two best sources of energy—sugar and milk—will find an unexcelled selling power.

Henry Maillard, Inc., New York City, have leased space in the new Straus Building, Chicago, and will open a retail store in the near future. They are also consolidating their New York and Brooklyn plants under one roof in a plant in Long Island City.

Gardner's Candies, Inc., 83 Mercer Street, New York City, is the name of a new concern recently organized by Morris Gardner, who is president. A. J. Simmons is secretary and treasurer. They have a modern factory of 5,000 feet at the above address and are making a line of specialties.

President A. S. Wynn has called a special meeting of the executive committee of the Southern Wholesale Confectioners' Association, to be held August 16th in Atlanta. They will plan a program for association work for the remainder of the year.

Poet—"I called to see if you had an opening for me."

Editor—"Yes, there's one right behind you. Shut it as you go out, please."—*Satire.*